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May 9, 2005

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: Appellant: David Barach
Application No.: 09/532,988 Filed: March 22, 2000
Confirmation No.: 8379
Title: An Efficient Method for Collecting Statistics Via a Half-Duplex Serial Bus
Docket No.:2386.2001-000

Sir:

Transmitted herewith is an Appeal Brief for filing in the subject application. The Appeal Brief is filed pursuant to the Notice of Appeal received by the U.S. Patent and Trademark Office on March 7, 2005.

1. [ ] Appellant hereby petitions to extend the time for filing an Appeal Brief for [ ] month(s) from [ ] to [ ].

2. [ ] A [ ] month extension of time to extend the time for filing an Appeal Brief from [ ] to [ ] was filed on [ ] with payment of a $[ ] fee.

[ ] Appellant hereby petitions for an additional [ ] month extension of time for filing an Appeal Brief from [ ] to [ ].

3. [ ] A Request for Oral Hearing before the Board of Patent Appeals and Interferences is being filed concurrently herewith.

4. Fees are submitted for the following:

[ ]	Extension of Time for [ ] month(s)			$ _____
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[X]	Appeal Brief			$ 500
[ ]	Other _____			$ _____
			TOTAL	$ 500

5. The method of payment for the total fees is as follows:

[ ] A check in the amount of $ is enclosed.

[X]Please charge Deposit Account No. 08-0380 in the amount of $500.

Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380. A copy of this letter is enclosed for accounting purposes.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

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Concord, MA 01742-9133
Dated: 5/9/05

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	David Barach		
Application No.:	09/532,988	Group:	2665
Filed:	March 22, 2000	Examiner:	Ryman, Daniel J.
Confirmation No.:	8379		

For: An Efficient Method for Collecting Statistics Via a Half-Duplex Serial Bus

CERTIFICATE OF MAILING

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on 5-9-05 Jennifer Torpey
Date Signature

Jennifer Torpey
Typed or printed name of person signing certificate

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted pursuant to the Notice of Appeal received in the U.S. Patent and Trademark Office on March 7, 2005, and in support of the appeal from the final rejection(s) set forth in the Office Action mailed on November 4, 2004. The fee for filing a brief in support of an appeal is enclosed.

I. REAL PARTY IN INTEREST

The real party in interest is Cisco Technology, Inc., 170 West Tasman Drive, San Jose, California 95134-1706. Cisco Technology, Inc. is the Assignee of the entire right, title and interest in the subject application, by virtue of an Assignment recorded on June 8, 2000 at Reel 010906, Frames 0203-0205.

II. RELATED APPEALS AND INTERFERENCES

Appellants, the undersigned Attorney, and Assignee are not aware of any related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 through 40 have been finally rejected, and a copy appears in the Appendix of this Brief. Claims 1, 10, 15-17, 19-20, 23-24, 26, 28-30, 32-33, and 39-40 were amended in the Amendment filed on August 21, 2003. Claims 1, 2, 10, 11, 19, 20, 23, 26, 29, 32, 33, 36, 39, and 40 were amended in the Amendment filed on January 26, 2004. Claims 1, 8, 10, 19, 20, 26, 32, 33, 39, and 40 were amended in the Amendment filed on August 25, 2004. Claims 3-7, 9, 12-14, 18, 21, 22, 25, 27, 31, 34, 35, 37, and 38 appear as originally filed. No claims have been canceled.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection mailed November 4, 2004. Accordingly, the claim listing as presented in the amendment filed August 25, 2004 are the claims on appeal. A copy of the pending claims is listed in the Claims Appendix enclosed with this Appeal Brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER

According to claim 1 as amended on August 25, 2004, the present invention is directed to a system for reducing bandwidth consumed by gathering statistical data via a half-duplex communication bus. The system includes a system controller and at least one element (e.g., line card) on the half-duplex communication bus. In a controlled manner, the element(s) automatically pre-gather the statistical data and report a subset of the statistical data via the half-duplex communication bus to the system controller in response to being polled for the statistical data or for a reason other than for the statistical data. The system controller determines if the statistical data is up-to-date and accesses the element(s) for the statistical data only if the age of

the statistical data in the controller is older than a predefined threshold indicating that the statistical data was not timely sent in place of a null response by the element(s).

To illustrate the invention, a half-duplex communication bus is presented in the application in a context of use with a high-speed communications bus, such as Digital Subscriber Line (DSL) bus, used for high-speed data communications. DSL can be used for high-speed access to the Internet. However, Applicant points out that the principles of the present invention as recited in the independent claims are not concerned with high-speed data communications but rather to low speed, half-duplex bus communications, as will become clear through the brief description below.

One aspect of the present invention replaces dead time in communications between a system controller and an element, such as a line card, operating on a half-duplex serial bus. By replacing dead time, it is meant that any communications that do not provide substantive information from the line card to the system controller are replaced with substantive information. The substantive information may include statistical data, which the system controller often requests or requires from the element. An example of the statistical data is health and status information about high-bandwidth ports on the line card.

The line card pre-gathers the statistical data and stores the statistical data in a self-identifying message in a message buffer, which is preferably organized in the form of a queue. In this way, when a non-substantive message is to be sent back to the system controller to fulfill the requirements of the half-duplex serial bus protocol, the self-identifying, substantive message can be issued in place of the non-substantive message. Referring to Fig. 4, for example, the null responses in the line card responses 420 can be replaced with the pre-gathered, substantive, self-identifying message that includes statistical port data.

Replacing the non-substantive message with port statistical data means that the system controller does not have to provide a formal request for the statistical data because it is automatically presented to the system controller by the line cards. Also, improved system controller and line card communications bandwidth is achieved because non-substantive messages are made substantive according to the teachings of the present invention, thereby reducing lost transmission time while communicating non-substantive messages across the half-duplex serial bus.

The clock rate of a UART (Fig. 3) corresponds to a bandwidth of 1.125 Mbits/sec. Some of the bandwidth is dead air in the communications; some of the bandwidth is taken up by non-substantive communications; and some of the bandwidth is used by substantive communications. Thus, substantive communications operating beyond 40-50 percent channel bandwidth causes loss of data due to the other bandwidth losses.

The well-known Simple Network Management Protocol (SNMP) for gathering the statistical data about the ports and the line cards requires a 1 Hz update rate. Line cards having four ports employing the straightforward statistics polling protocol (Fig.4) acquires statistical data at approximately 4 Hz. Because it is desirable to increase the number of high-bandwidth ports per card to support wide area network (i.e., the Internet) demand, and due to new technologies such as DSL, there is a push to provide eight ports per line card to increase the number of ports within a central office (Fig. 1). The present invention allows statistical data to be gathered within the 1 Hz latency requirement of SNMP.

Fig. 5 is a chart showing a statistics polling protocol according to the principles of the present invention. The chart 500 includes system controller messages 510 to a line card, and line card messages 520 to the system controller. The difference between the present invention statistics polling protocol chart 500 and the polling protocol of the prior art chart 400 (Fig. 4) are the messages sent from the line card to the system controller in place of the null responses by the prior art. In the present invention, port A statistical data and port B statistical data 525, 530, respectively, is reported from the line card to the system controller in place of null responses. In that way, there are a reduced number of statistical data requests by the system controller. Further, there are a reduced number of wasted cycles, null responses, which are merely used to meet the half-duplex serial bus communication protocol. The port A statistical data and port B statistical data message are self-identifying (i.e., told in the messages what the respective data represent) to help the system controller since it does not explicitly request the data from the line card.

Fig. 6 graphically illustrates the messages, or datagrams, passing between the system controller and line cards. In step 605, the system controller provides a poll datagram. The poll datagram is illustrated as a 32-bit message having a typical message format, but may be up to a 255 byte message in the communication protocol. In this case, the datagram is specified to

transmit to slot_4. Slot_4 is a slot on a backplane in a chassis in which a line card resides. The poll datagram in step 605 may be any message the system controller can send, including a null message. For example, the poll datagram may be issued to poll the line card to determine whether or not it is on- line.

The line card receives the poll datagram, of step 605, and performs processing based on that datagram. However, in the half-duplex serial bus protocol, the line card is required to provide a response message to the system controller to acknowledge that it has received the datagram. In the past, a null response 425 (Fig. 4) was returned from the line card to the system controller. However, according to the principles of the present invention, the line card returns substantive statistical data in the datagram of step 610. The protocol ID bit is set to "1" which indicates an unsolicited, statistical message, as opposed to something that should be processed by an IOS IPC stack. Examples of solicited messages that are run through the IOS IPC stack include: training, not-in-service, testing, downloading, Far-End LPR (Low Power), Near-End LOS (Loss of Signal), Near-End LOF (Loss of Framing), etc.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

ISSUES

(i) Whether claims 10 and 19 are properly objected to because of the following informalities: "only if the age of the statistical data in the system controller was not timely sent" should be "only if the statistical data in the system controller was not timely sent."

(ii) Whether claim 37 fails to comply with the enablement requirement under 35 U.S.C. 112, first paragraph.

(iii) Whether claims 1-40 are unpatentable under 35 U.S.C. 103(a) over Applicant's admitted prior art (Background section of specification, pages 1-6) in view of Allen et al. (USPN 5,495,522) in further view of Naimpally et al. (USPN 5,650,825) in further view of Carney et al. (USPN 6,449,663).

VII. ARGUMENT

Group I: Claims 1 - 40

The claims in Group I stand or fall together.

A. Applicant's Admitted Prior Art

Fig. 1 depicts a network 100 in which the prior art (Figs. 1 - 4) and the present invention (Figs. 5 - 9B) may be employed. The description below in reference to Figs. 1-4 was disclosed by Applicant in the Background Section of the application as originally filed and therefore, Applicant's admitted prior art. The network arrangement of Fig. 1 allows multiple subscribers 110 to access the Internet 130. Each subscriber has an individual subscriber line 115 that connects to a central office 120. In the case of DSL, each subscriber has a dedicated line to the central office that is always ON; channel sharing occurs further upstream.

The dedicated lines are further illustrated in Fig. 2. Within the central office, a DSLAM (Digital Subscriber Line Asynchronous Multiplexer) 210 has *n* inputs, one corresponding to each subscriber line. Typically, the subscriber lines range from about one to three and one-half miles long, which is useful for servicing a wide coverage area of subscribers (i.e., residential and business addresses).

A typical DSLAM 210 is an ATM (Asynchronous Transmission Mode) MUX (multiplexer) or switch. In a DSLAM system, the subscriber lines may operate various protocols, including PPP over ATM or IP (Internet Protocol) over ATM (RFC 1483), among other existing or developing telecommunication protocols. On the other side of the DSLAM is a communication trunk 215, which typically employs a very high bandwidth communication protocol, such as OC3 or DS3. The trunk is coupled to an ATM network 220 which is further coupled to an ISP (Internet Service Provider) 230.

Still within the central office 120, other DSLAMs are performing the same functions with other subscribers. Multiple DSLAMs operate within a single central office because each subscriber has a dedicated subscriber line to access the Internet, for example. Because of the multiple DSLAMs, the central office 120 is typically equipped with a network management station 240 to collect the statistical data regarding health and status from the DSLAMs.

Alternatively, the network management station may be located at a remote location and gather statistical data from the DSLAMs over a network, via standard telephone lines, or through another data transmission system. Further, other network management station/DSLAM hierarchies and configurations (not shown) are possible. It should be understood that the network management station may be a server or other dedicated computer for managing the DSLAMs and the status information regarding the DSLAMs.

The network management station may use SNMP (Simple Network Management Protocol) to gather the statistical data and other information from the DSLAMs. In SNMP, statistical data of each port is required to be gathered at about a 1 Hz update rate (i.e., one second out-of-date granularity). To account for the 1 Hz update rate, the controllers in each of the DSLAMs must gather the statistical data of each port at 1 Hz and transmit that gathered statistical data of each port to the network management station upon demand.

Further, the network management station 240 provides external communications with a central network management station 250, which is charged with gathering and managing status information for multiple central offices. The central network management station 250 may be located at a central service office. The central service officer dispatches human workers in response to information, gathered by the central management station, suggesting that a subscriber line connecting to a respective DSLAM in a respective central office is experiencing difficulty, either with the line itself or with the communication port in the DSLAM.

Fig. 3 is a more detailed schematic diagram of the DSLAM 210. The DSLAM has a system controller 310 and a plurality of line cards 330. The system controller and line cards reside, typically, in a card-cage chassis having a backplane with typical address and data bus topologies for inter-card communications. The line cards are also referred to in the application and claims as "elements."

In a typical card-cage chassis (not shown), system controllers and line cards reside in respective, pre-defined, dedicated slots. In one configuration, for example, two system controllers reside in slots 10 and 11, and line cards reside in slots 1-9 and 12-38. Inter-card communications are transacted across a backplane having two serial buses, each serial bus servicing half of the line cards. The backplane is designed in a half-duplex serial bus protocol configuration.

In a half-duplex communication protocol, only one card communicates at any one time, and many request, acknowledge, reply, poll, and null messages pass between the system controller and the line card being interrogated in order to retrieve status information, discussed below in reference to Fig. 4.

The system controller 310 has a processor 315 and a UART (Universal Asynchronous Receiver Transmitter) 320. The processor employs the UART to perform inter-device communications. The UART has a transmitter port Tx and a receiver port Rx. The transmitter port communicates to receiver ports on each of the line cards 330. The receiver port in the UART receives data from transmitter ports on the line cards. The UART may be integrated into a FPGA (Field Programmable Gate Array) or some other generic or application-specific integrated circuit.

Each line card includes at least one high-speed communication port that interfaces with a DSL subscriber. In the embodiment depicted in Fig. 3, the line cards employ four ports for high-bandwidth communications. Further, the line cards employ processors 335, which interface with the UART 320 in the system controller through buffers 332, 334 and with the modem chips providing the high-bandwidth communications. Memory (not shown) is used by the processor 335 for storing status information indicating functionality and other aspects of the line cards. The line card processor may also be tasked with managing the half-duplex serial bus protocol.

Fig. 4 is a chart 400 of a prior art statistics polling protocol enabling system controller-to-line card communications. The chart 400 includes two columns: a system controller message column 410 and a line card message column 420. The columns indicate a sequence of message communications back and forth between the system controller and a line card for requesting and transmitting data in the half-duplex communication bus protocol.

In the example sequence of communication messages between the system controller and line card, the system controller requests information from the line card using an IPC RPC request. An IPC RPC request is an interprocessor communication, remote procedure call message to the line card. The interprocessor communication portion indicates to the line card that a processor in the system controller requests information from the line card receiving the message. The remote procedure call indicates to the line card that it is to run an internal software procedure to provide the requested information.

In response to the IPC RPC request, the line card fetches the information from memory or other circuit, such as a modem chip supporting a high-bandwidth communication port. In the meantime, the line card transmits a "null response" message 425 to the system controller. After receiving the null response message, the system controller issues a "poll" message to the line card to determine if the line card has the requested information available. In response to the poll message, the line card issues an acknowledge message for the IPC RPC request. After receiving the acknowledge message, the system controller issues another "poll" message to the line card. The line card, in turn, issues an IPC RPC reply to the system controller with the information requested by the IPC RPS request. Finally, the system controller issues an acknowledge (ACK) for the IPC RPC reply to the line card. Thereafter, the line card issues a null response to end the transaction.

B. The Allen *et al.* patent ("Allen")

Allen discloses a system that pre-gathers statistical data in response to a request for the statistical data. Specifically, in column 76, lines 20-22 and 30-31, Allen describes this process ("[t]his part of the process would periodically gather the A/B bits from the T1 card's registers" and "The second part of the ...process collects data from the T1 card and stores it in the Data Base"). Applicant notes that in Column 76, lines 31-32, Allen appears to have further work to do in the actual mechanics of gathering data ("[t]he actual mechanics of how this data is gathered will depend on what one Miter card can offer us").

C. The Naimpally *et al.* patent ("Naimpally")

Naimpally discloses an apparatus and method applicable to variable bit rate video and constant bit rate video for an MPEG Transport Stream System (e.g., HDTV). Naimpally replaces "stuffing bites" with private data. Naimpally inserts useful private data in a Transport Stream instead of the stuffing bites in a manner that still complies with established standards of a high-speed communications network that can transport variable and constant bit rate video, such as high definition television (HDTV).

As described in Naimpally, column 2, lines 57 et seq., "[i]n order to maintain constant bitrate video, 'stuffing' is implemented within various aspects of the system. 'Stuffing' is the act of filling the data stream with 'don't care' and 'information' simply to maintain the required bit-

rate." Stuffing may be used when there is insufficient data to fill a Transport Stream packet payload bytes to a level that supports the transmit data rate. Stuffing can be accomplished by defining an adaptation field longer than the sum of the lengths of the data elements in it so that the payload bytes remaining after the adaptation field exactly accommodates the available data. The extra space in the adaptation field and/or payload can be filled with stuffing bytes. It is these stuffing bytes or a portion thereof that Naimpally replaces with private data, referred to as "privatestuff data" in order to distinguish it from typical private data which may otherwise be encoded into a transport stream, as stated in column 4, lines 48-51. In column 5, Naimpally suggests that his invention could also take advantage of wasted resources of a NULL packet by remultiplexing the packet to include privatestuff data and all other appropriate fields (e.g., adaptation in private data fields). Naimpally also discloses in the paragraph bridging columns 5 and 6 that the stuffing bytes are only used on an "as needed" basis, such as when the video channel "wants" to send stuffing bytes. Examples of information Naimpally suggests can be sent as privatestuff data include program reviews, program synopses, etc. for programs to be transmitted at a later time.

D. The Carney et al. patent ("Carney")

Carney discloses a computer that holds peripheral devices via a communication protocol, such as Simple Network Management Protocol (SNMP) or other communication protocol. A management application operating on the computer may collect status information (i.e., determine if an interrupt has occurred) from the peripheral device by periodically sending an inquiry to (i.e., polling) each device, in order to collect information regarding the device. The period of time between the requests/polls is known as the polling interval. Carney discloses that when a management application uses polling to collect information regarding a peripheral device, there are tradeoffs. For example, by using shorter intervals between polling inquiries (i.e., more frequently polling), less time will pass before an alert is discovered. However, the more frequent polling is provided at the cost of increased network traffic, and the additional consumption of processing resources. In column 2, Carney discloses that in one embodiment, if the peripheral device being monitored is in the process of performing a job or has experienced an interrupt/alert, the length of the polling intervals may be shortened to provide increased

monitoring of the peripheral device. If the peripheral device is idle, the length of the polling intervals may be longer to provide less monitoring of the peripheral device.

E. The Objections

As stated in the Final Office Action mailed November 4, 2004, on page 2, claims 10 and 19 stand rejected to because of the following informalities: "only if the age of the statistical data in the system controller was not timely sent" should be "only if the statistical data in the system controller was not timely sent."

Applicant thanks Examiner for pointing out this informality. Applicant will correct this informality upon a decision of this appeal or, in the alternative, grants permission to the Examiner for correcting same via Examiner's Amendment.

F. Claim Rejection under 35 U.S.C. § 112, first paragraph

Claim 37 recites, "instructions to make the statistical data available in the buffer as often as necessary but not so often that the buffer is congested by the statistical data." The specification discloses on page 11, lines 21-24, that "the statistical data about port A may be limited to being gathered about as often as the system controller gathers the statistical data (e.g., one second). In other words, the statistical data is gathered in the output buffer as often as necessary, but not so often that the buffer is congested by the statistical data."

Applicant believes that the phrases "to make the statistical data available" and "to pre-gather the statistical data" are sufficiently similar such that the specification and Figs. 5 and 8A supports the claims. Thus, Applicant does not believe that the differences between the invention as recited in Claim 37 as originally filed in view of the specification and drawings rise to a level of failing to comply with the enablement requirement under 35 U.S.C. 112, first paragraph. Nevertheless, Applicant agrees to amend the claims to replace the terms "to make" with -- to pre-gather-- in claim 37 following a decision on this appeal. Applicant points out that claims 6 and 7 will also be amended in a similar manner. In the alternative, Applicant grants permission to the Examiner for correcting same via Examiner's Amendment.

G. The Rejection under 35 U.S.C.§ 103(a)

Claims 1-40 (Group I herein) stand rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's disclosed prior art (referred to herein as Applicant) in view of Allen in further view of Naimpally in further view of Carney. On pages 3-8 of the Final Office Action mailed November 4, 2004 ("Final Office Action"), Examiner sets forth an argument combining the four references listed above.

With regard to the independent claims, claims 1, 10, 19, 20, 26, 32, 33, 39, and 40, Examiner directs attention to the background section provided by Applicant to identify several of the limitations. In particular, Examiner states that Applicant admits as prior art system, method, apparatus, and computer program for gathering statistical data from at least one element (line card) in a multi-processor system employing a half-duplex bus by a system controller, where the Examiner takes Official Notice that computer programs are well known in the art. Examiner states that gathering statistical data, about a high-speed port, from at least one element line card in a multi-processor system employing the half-duplex bus is disclosed by Applicant as prior art at page 3, line 11 through page 4, line 20. Examiner further points out that Applicant disclosed as prior art in the background section steps of reporting the statistical data from the buffer to a system controller when polled by the system controller for the statistical data at page 5, line 9 through page 6, line 6.

The Final Office Action states that Applicant does not admit that prior art automatically pre-gathers the statistical data in an information buffer in a controlled manner by an element of the multi-processor system. Allen is used to make up for this deficiency, where Allen teaches, in a system employing line cards, automatically pre-gathering the statistical data in an information buffer (register) in a controlled manner by an element (line card). The Final Office Action states on page 4, first full paragraph that it is implicit that pre-gathering is done in order to provide at the time of collection the statistical data collected over a period of time (Allen: col. 76, lines 17-37). Based on this combination, the Office Action states that it would have been obvious to one of ordinary skill in the art at the time of the invention to automatically pre-gather the statistical data in an information buffer in a controlled manner by an element where it is implicit that it is done in order to provide at the time of collection the statistical data collected over a period of

time. The Final Office Action further states in the paragraph bridging page 4, and 5, first sentence that

> Applicant in view of Allen does not disclose reporting the statistical data from the buffer to a system controller in response to being polled for a reason other than for the statistical data; however, Applicant in view of Allen discloses that a NULL is sent to the controller when the element is polled for some other reason (Applicant: page 5, line 9 through page 6, line 6).

To make up for the shortcomings of Applicant in view of Allen with regard to reporting the statistical data "for a reason other than for the statistical data," Examiner combines Naimpally with Applicant and Allen because, as stated on page 4, bottom paragraph, second sentence of the Final Office Action, "Naimpally discloses, in a data transmission system, transmitting substantive data in place of null messages in order to take advantage of the 'wasted resources of a NULL packet' (Naimpally: col. 2, line 57- col. 3, line 43; col. 4, line 66-col. 5, line 5; and col. 12, lines 1-7)." The Final Office Action further states that, "it would have been obvious to one of ordinary skill in the art at the time of the invention to transmit statistical data to the system controller when polled for some other reason in order to take advantage of the wasted resources of the NULL packet that is typically transmitted in response to a poll for some other reason."

The Final Office Action on page 5, first full paragraph states that,

> Applicant in view of Allen in further view of Naimpally does not expressly disclose having the system controller determine if the statistical data is up-to-date and accessing the at least one element for the statistical data only if the age of the statistical data in the controller is older than a predefined threshold indicating that the statistical data was not timely sent in place of a null response by the at least one element.

To make up for this shortcoming, Examiner applies Carney, which teaches, in a polling system, that using shorter intervals for polling increases the cost of polling to the network; however, longer intervals for polling increases the amount of time that will pass before a system recognizes changes in the system (col. 1, lines 46-59). The Office Action goes on to state that

it would have been obvious to one of ordinary skill at the time of the invention to have the system controller determine if the statistical data is up-to-date (polling interval has elapsed) and accessing the at least one element for the statistical data only if the age of the statistical data in the controller is older than a predefined threshold (polling interval) indicating that the statistical data was not timely sent in place of a null response by the at least one element in order to ensure that the system has the most accurate information at the least cost to the system.

H. Novelty of the Claims

The problem with the statistics polling protocol of the prior art, as described above in reference to Fig. 4, is the number of non-substantive messages required for transferring data and the reactionary method for gathering the data. As the number of high-bandwidth channels increases on a per line card basis, it becomes more difficult for the line cards to report the high-bandwidth port status data within an update rate required by statistics gathering protocols, such as the one second update rate required by the SNMP protocol. Specifically, null response messages, issued by the line cards to the system controller to work in the half-duplex serial bus communication protocol, are wasted communication cycles. The present invention replaces non-substantive messages (e.g., null response messages) with substantive data messages (e.g., statistical data providing health and status information regarding high-bandwidth communication ports).

The present invention reduces the bandwidth consumed by gathering data on a communication bus in an efficient manner. A system controller gathers the data from at least one element (e.g., a line card) in a system employing the communication bus. The element performs two functions. First, the element automatically provides data for the system controller. The data may be temporarily stored in a buffer. Second, the element reports a subset of the data in the buffer to the system controller when polled, either for the statistical data or for some other reason. Optionally, the buffer is organized in a queue, and a subset of the statistical data is reported in place of a null response message, for example, whenever the statistical data has reached the head of the queue. To avoid filling the limited-size buffer with only the statistical

data, the present invention controls the gathering of data in the queue, preferably by storing only one instance of data per port at any given time in the buffer. In the preferred embodiment, the element reports the data in place of reporting a null response to the system controller whenever possible. The data may be statistical data for high-bandwidth ports or other element-related data. Preferably, the data is reported in a self-identifying message since the system controller typically does not specifically request the data before receiving it.

Independent claims 1, 10, 19, 20, 26, 32, 33, 39, and 40 are directed to a system, method, apparatus, and computer program for gathering statistical data via a half-duplex communication bus. In claim 1, for example, the system controller and at least one element (line card) communicate via the half-duplex communication bus. As recited in claim 1, "the automatic pre-gathering and subsequent reporting of statistical data reducing the number of communications and data transfer cycles required to transfer the statistical data . . . resulting in a reduction of bandwidth consumed by gathering the statistical data from the element via the half-duplex communication bus." Thus, Applicant's claim is directed to a half-duplex communication bus.

As disclosed on page 8, lines 22-25 of the specification as originally filed, "when a non-substantive message is to be sent back to the system controller to fulfill the requirements of the half-duplex serial bus protocol, the self-identifying, substantive message can be issued in place of the non-substantive message." Comparing the prior art polling protocol of Fig. 4 with the statistics polling protocol of Fig. 5, one clearly sees that the null response 425 of Fig. 4 is replaced with ports A and B statistical data 525 and 530 in Fig. 5, as described on page 9, line 25 through page 10, line 5. In this way, there are a reduced number of statistical data requests by the system controller. Further, there are a reduced number of wasted cycles (i.e., null responses) which are merely used to meet the half-duplex serial bus communication protocol.

Among all of the cited references set forth in the Final Office Action, only Naimpally discloses null messages that are replaced with substantive data. However, as described above, Naimpally is directed to a communications network having a Transport Stream for video streaming, such as high definition television (HDTV). It is Applicant's contention that a communications protocol for a video streaming network is non-analogous art with regard to a half-duplex serial bus.

In MPEP 904.01(c) "Analogous Arts", the second paragraph states:

> [t]he determination of what arts are analogous to a particular claimed invention is at times difficult. It depends upon the necessary essential function or utility of the subject matter covered by the claims, and not upon what it is called by the applicant.

Applicant believes that "Null response" recited in Claim 1 is giving rise to such a circumstance, where Naimpally also uses the term "Null". However, given the subject matter covered by the claims, Applicant respectfully submits that Naimpally is non-analogous art. Further specific reasoning is set forth below.

MPEP 1302.14(G) states that "allowance [can be] based on a claim interpretation which might not be readily apparent, for example:... (3) claim is so drafted that "non-analogous" art is not applicable." Applicant believes the independent claims are drafted in a manner ("half-duplex serial bus") as to cause Naimpally to be treated as non-analogous art.

MPEP 2141.01(a) "Analogous and non-analogous art" states that to rely on a reference under 35 U.S.C. 103, such as in the present case, it must be analogous prior art, which Applicant urges Naimpally is not for reasons described further herein below. Further, MPEP 2141.01(a) states that

> [t]he Examiner must determine what is "analogous prior art" for the purpose of analyzing the obviousness of the subject matter at issue. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, be reasonably pertinent to the particular problem with which the inventor was concerned."

In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ 2d 1443, 1445 (Fed.Cir. 1992). See also *In re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed.Cir. 1986); *In re Clay,* 966 F.2d 656, 659, 23USPQ 2d 1058, 1060-61 (Fed. Cir. 1992) ("a reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the subject matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem.")

"Where the general scope of a reference is outside the pertinent field of endeavor, the reference may be considered analogous art if the subject matter disclosed therein is relevant to

the particular problem with which the inventor is involved." *State Contracting & Eng'g Corp. v Condotte America Inc.*, 346 F.3d 1057, 1069, 68 USPQ 2d 1481, 1490 (Fed. Cir. 2003).

Also described in MPEP 2141.02 are examples of analogy in the electrical arts. An example set forth is *Wang Laboratories, Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ 2d 1767 (Fed. Cir. 1993). In *Wang*, patent claims were directed to single in-line memory modules (SIMMs) for installation on a printed circuit motherboard for use in personal computers. Reference to a SIMM for an industrial controller was not necessarily in the same field of endeavor as the claimed subject matter merely because it related to memories. Reference was found to be in a different field of endeavor because it involved memory circuits in which modules of varying sizes may be added or replaced, whereas the claimed invention involved compact modular memories. Furthermore, since memory modules of the claims at issue were intended for personal computers and used dynamic random-access-memories, whereas reference SIMM was developed for use in large industrial machine controllers only taught the use of static random-access-memories, or Read-Only memories, the finding that the reference was non-analogous was supported by substantial evidence.

Also described in MPEP 2141.02 is *Medtronic, Inc. v. Cardiac Pacemakers*, 721 F.2d 1563, 220 USPQ 97 (Fed.Cir. 1983). At issue in *Medtronic* were patent claims drawn to a cardiac pacemaker which comprised, among other components, a runaway inhibitor means for preventing a pacemaker malfunction from causing pulses to be applied at too high a frequency rate. Two references disclosed circuits using high power, high frequency devices which inhibited the runaway of pulses from a pulse source. The court held that one of ordinary skill in the pacemaker designer art faced with a rate-limiting problem would look to the solutions of others faced with rate-limiting problems, and therefore, the references were in an analogous art.

The issue in the Final Office Action at hand is whether the data transmission system disclosed by Naimpally is analogous art to the half-duplex communication bus as recited in Applicant's independent claims.

On January 26, 2004, the Applicant, David Barach, Applicant's and representative, Mark Solomon, conducted an Examiner's interview with Examiner Ryman regarding this point. As summarized in an interview summary mailed February 3, 2004:

> Applicant argued that a prima facie case of obviousness was not established

> and that Naimpally was not analogous prior art since Naimpally's embodiment is directed to a high-speed data stream. Examiner asserted that Naimpally's invention is directed towards efficiently using bandwidth in a communications system by replacing null data with pertinent data where the specific embodiment of Naimpally pertains to an MPEG system. As such, Naimpally's invention can be used in systems other than the high-speed data stream of the disclosed embodiment. In addition, Examiner asserted that the rejection was based upon a combination of references, where the combination of references rendered the claim obvious, not Naimpally individually. After hearing Examiner's reasons for using Naimpally and Examiner's interpretation of Naimpally, Applicant agreed that the claims could be amended to overcome the prior art by adding further limitations.

In a Reply filed March 2, 2004 in response to the interview summary of February 3, 2004, Applicant essentially repeated this same statement and further suggested that the claims could be amended to distinguish more clearly over the cited references by adding further limitations for purposes of expediting prosecution. Applicant, however, explicitly reserved the right to file claims on the originally filed subject matter at a later date. Accordingly, Applicant filed a Request for Continued Examination (RCE) on January 26, 2004 with an amendment that included limitations Applicant believed were non-obvious in view of the combination of cited references cited in the Office Action mailed October 24, 2003.

Applicant believes that, upon further evaluation, Naimpally cannot be combined with the other references because Naimpally discloses an embodiment of an invention operating in a network that does not use polling to request information, and, therefore, cannot be used in combination with half-duplex communication buses to teach, suggest, or provide motivation for Applicant's invention as recited in the independent claims as initially set forth in Applicant's amendment of January 26, 2004. Applicant hereby states that conceding this point during the Examiner's interview on January 26, 2004 and in the Reply mailed March 2, 2004 responsive to the Interview Summary mailed February 3, 2004 was in error based upon further evaluation of Naimpally, which is set forth immediately below.

Every figure of Naimpally is directed to an MPEG bit stream. In particular, Naimpally discloses determining locations of "stuffing" bytes and performing re-multiplexing of "privatestuff" data in place of the stuffing bytes in Fig. 4A and Fig. 5. In the field of the invention section in column 1, Naimpally states that his invention relates generally to data storage and transmission using "MPEG standards and, more particularly, ... to the established standards of transmitting 'private data' and 'stuffing bytes' in a transport data stream complying with MPEG standards." Further, the title of Naimpally is "Method and Apparatus for Sending Private Data Instead of Stuffing Bits in an MPEG Bitstream." Moreover, Naimpally's independent claims 1, 6, 11, and 15 are all directed to an MPEG bitstream. Applicant finds no disclosure by Naimpally that replacing null data with pertinent data can be used in systems other than a high-speed MPEG datastream or the like.

Further, Naimpally in Fig. 9 shows a block diagram of an exemplary embodiment of a privatestuff processor suitable for use with his stuffing bytes replacement with privatestuff data through use of re-multiplexing means. In comparison to Applicant's Fig. 2, one skilled in the art would understand Naimpally's privatestuff processor of Fig. 9 to be found in the DSLAM 210 of Applicant's Fig. 2 for servicing the Trunk - High Bandwidth (BW) Pipe 215 using a protocol such as OC 3/DS3 to be applicable to a half-duplex bus system or even suggestable for use with one, Naimpally would have to disclose that the Naimpally controller 918 of Fig. 9 could be coupled to a half-duplex bus. See for example Applicant's Fig. 3, processor 335 in communication with the UART 320 via the half-duplex communication bus transmit and receive lines.

Although Applicant's claimed invention and Naimpally's disclosure are related to the very general area of network communications, one of ordinary skill in the art would not seek guidance from a communications system that services MPEG bitstream to determine an efficient method for collecting statistics via a half-duplex serial bus. For example, in evidence of this proposition, there is no "back and forth" from the controller 918 of Naimpally with a far end receiver that receives the video with stuffing bytes replaced by privatestuff data. In contrast, Applicant's Fig. 5 describes bi-directional "handshaking" communications between a system controller and line card in communication with each other via the half-duplex serial bus. Without such bi-directional communications disclosed or even suggested by Naimpally,

Applicant can no longer agree with Examiner that Naimpally's invention can be applied to any network other than a high-speed communications MPEG bitstreaming network or the like.

Furthermore, Applicant points to differences between the datagrams of Applicant's Fig. 6, which are very simple, and the datagram illustrated in Naimpally's Fig. 3 and Figs. 8A-8C, which causes Naimpally to execute a re-multiplexing step as part of a required process. Were datagrams in a half-duplex serial bus in need for replacement of individual null bits in a particular datagram, Applicant may understand a possible relationship between Naimpally's MPEG streaming network and Applicant's claimed invention. However, because Applicant is reducing a number of wasted cycles (i.e., null responses) and Naimpally replaces bits in a datagram but maintains the same number of cycles, Applicant suggests that there is no teaching to cinbine Naimpally with any other reference cited in the Final Office Action. Applicant acknowledged that Naimpally in column 5, lines 1-5 discloses that his invention could take advantage of wasted resources of a null packet, but such disclosure is done in the context of re-multiplexing the packet to include privatestuff data and all other appropriate fields. Applicant respectfully points out that such disclosure must be read in context to the overall reason for having stuffing bytes or null packets in MPEG transport datastream systems, which is to maintain a consistent number of bits in transport packets. In other words, Naimpally gains additional transmission bandwidth by using unused bits within a transport packet whereas Applicant gains additional bandwidth by responding to a query with substantive data thereby reducing half-duplex bus communications. No such communications reduction can be done in an MPEG transport system.

Because Naimpally is not directed to issues related to a half-duplex serial bus, Applicant respectfully submits that the rejections under 35 U.S.C. 103(a) in the final office action mailed November 4, 2004 should be withdrawn. Accordingly, Applicant respectfully requests the independent claims in Group I (claims 1, 10, 19, 20, 26, 32, 33, 39, and 40) should be granted reconsideration by Examiner in view of this Appeal and arguments set forth hereinabove.

For at least the same reasons, the dependent claims should also be allowed.

Respectfully submitted,

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Date: 5/9/05

CLAIMS APPENDIX

1. (Previously Presented) A system for reducing bandwidth consumed by gathering statistical data via a half-duplex communication bus, comprising:

a system controller gathering statistical data via a half-duplex communication bus;

at least one element in the system also on the half-duplex communication bus, said element:

(i) in a controlled manner, automatically pre-gathering the statistical data in an information buffer in the element; and

(ii) reporting a subset of the statistical data in the buffer to the system controller in response to being polled for the statistical data or for a reason other than for the statistical data;

the automatic pre-gathering and subsequent reporting of statistical data reducing the number of communications and data transfer cycles required to transfer the statistical data from the element to the system controller resulting in a reduction of bandwidth consumed by gathering the statistical data from the element via the half-duplex communication bus; and

the system controller determining if the statistical data is up-to-date and accessing the at least one element for the statistical data only if the age of the statistical data in the controller is older than a predefined threshold indicating that the statistical data was not timely sent in place of a null response by the at least one element.

2. (Previously presented) The system according to Claim 1 wherein the buffer is organized in a queue and the statistical data is reported after the statistical data has reached the head of the queue.

3. (Original) The system according to Claim 1 wherein the element is a line card having at least one processor monitoring at least one communication port.

4. (Original) The system according to Claim 1 wherein the system reports the gathered statistical data to a central statistical data gathering system.

5. (Original) The system according to Claim 1 wherein:

the statistical data includes information about an element communication port; and

the buffer stores only one instance of information about a communication port at any given time.

6. (Original) The system according to Claim 1 wherein the element makes statistical data regarding respective ports available at least as often as the system controller requires the statistical data.

7. (Original) The system according to Claim 1 wherein the element makes the statistical data available at least one time per second.

8. (Previously Presented) The system according to Claim 1 wherein the element pregathers the statistical data available as often as necessary but not so often that the buffer is congested by the statistical data.

9. (Original) The system according to Claim 1 wherein the element reports statistical data in place of reporting a null response.

10. (Previously Presented) A method for reducing bandwidth consumed by gathering statistical data on a half-duplex communication bus, comprising:

gathering statistical data from at least one element in a multiprocessor system employing the half-duplex bus;

automatically pre-gathering the statistical data in an information buffer in a controlled manner by the at least one element in the multiprocessor system; and

reporting the statistical data from the buffer to a system controller in response to being polled for the statistical data or for a reason other than for the statistical data;

the automatic pre-gathering and subsequent reporting reducing the number of communications and data transfer cycles required to transfer the statistical data from the

element to the system controller resulting in a reduction of bandwidth consumed by gathering the statistical data about the elements via the half-duplex communication bus; and

determining if the statistical data in the system controller is up-to-date and accessing the at least one element for the statistical data only if the age of the statistical data in the system controller was not timely sent in place of a null response by the at least one element.

11. (Previously presented) The method according to Claim 10 wherein the element further comprises:

organizing the data in the buffer in a queue; and

reporting the statistical data after the statistical data has reached the head of the queue.

12. (Original) The method according to Claim 10 wherein the element is a line card having at least one processor monitoring at least one communication port in the line card.

13. (Original) The method according to Claim 10 further comprising reporting to a central statistical data gathering system the statistical data gathered from the elements.

14. (Original) The method according to Claim 10 wherein:

the statistical data refers to an element communication port; and

the buffer stores only one instance about an element communication port at any given time.

15. (Previously Presented) The method according to Claim 10 wherein automatically pre-gathering statistical data is performed at least as often as the statistical data is gathered by the system controller.

16. (Previously Presented) The method according to Claim 10 wherein automatically pre-gathering statistical data is performed at least one time per second.

17. (Previously Presented) The method according to Claim 10 wherein automatically pre-gathering statistical data is performed as often as necessary but not so often that the buffer is congested by the statistical data.

18. (Original) The method according to Claim 10 wherein reporting the statistical data is performed in place of reporting a null response.

19. (Previously Presented) A system for reducing the bandwidth consumed by gathering statistical data via a half-duplex communication bus, comprising:

means for gathering statistical data from at least one element in the system employing a half-duplex communication bus;

means for automatically pre-gathering the statistical data, in a controlled manner, in a buffer associated with the means for automatically pre-gathering statistical data; and

means for reporting the statistical data to said means for gathering the statistical data in response to being polled for the statistical data or for a reason other than for the statistical data and the statistical data is selected to be reported;

said means for automatically pre-gathering and said means for reporting reducing the number of communications and data transfer cycles required to transfer the statistical data from the element to the means for gathering the statistical data resulting in a reduction of bandwidth consumed by gathering the statistical data about the elements via the half-duplex communication bus; and

said means for gathering the statistical data including means for determining if the statistical data in the system controller is up-to-date and means for accessing the at least one element for statistical data only if the age of the statistical data in the system controller was not timely sent in place of a null response by the at least one element.

20. (Previously Presented) An apparatus for reducing the bandwidth consumed by gathering statistical data on a half-duplex communication bus, comprising:

at least one communication port having high-speed communication capabilities with external devices;

a processor coupled to the communication port, the processor maintaining statistical data about the communication port;

a buffer coupled to the processor, the processor automatically pre-gathering in the buffer, in a controlled manner, the statistical data; and

an interface transmitting the statistical data to the system controller in response to being polled for the statistical data or for a reason other than for the statistical data and the statistical data is selected to be reported; and

the processor adapted to respond to a request for the statistical data from the system controller, the request received from the system controller only if the statistical data was not timely sent to the system controller in place of a null response by the processor.

21. (Original) The apparatus according to Claim 20 wherein the statistical data in the buffer is organized in a queue.

22. (Original) The apparatus according to Claim 20 wherein the processor limits the statistical data in the buffer to one entry per port at any given time.

23. (Previously presented) The apparatus according to Claim 20 wherein the processor pre-gathers statistical data associated with a port at at least the rate of being requested by the system controller.

24. (Previously Presented) The apparatus according to Claim 20 wherein the processor pre-gathers data about a port as often as necessary but not so often that the buffer is congested by the statistical data.

25. (Original) The apparatus according to Claim 20 wherein the statistical data is reported in place of reporting a null.

26. (Previously Presented) In a line card having at least one communication port, a method for reducing the bandwidth consumed by gathering statistical data on a half-duplex communication bus, comprising:

maintaining statistical data about at least one communication port;

automatically pre-gathering the statistical data in a buffer;

transmitting the statistical data to a system controller in response to being polled for the statistical data or for a reason other than for the statistical data and the statistical data is selected to be reported; and

responding to a request from the system controller for the statistical data, the request received from the system controller only if the statistical data was not timely sent to the system controller in place of a null response by the processor.

27. (Original) The method according to Claim 26 wherein the statistical data in the buffer is organized in a queue.

28. (Previously Presented) The method according to Claim 26 wherein pre-gathering the statistical data in the buffer limits the number of entries per port in the buffer.

29. (Previously presented) The method according to Claim 26 wherein pre-gathering the statistical data in the buffer occurs at at least the rate of requests for data about an individual port.

30. (Previously Presented) The method according to Claim 26 wherein pre-gathering the statistical data in the buffer occurs as often as necessary but not so often that the buffer is congested by the statistical data.

31. (Original) The method according to Claim 26 wherein transmitting the statistical data occurs in place of transmitting a null response message.

32. (Previously Presented) An apparatus for reducing the bandwidth consumed by gathering statistical data on a half-duplex communication bus, comprising:

means for supporting high-speed communications with external devices;

means for pre-gathering statistical data about the means for supporting high-speed communications;

means for automatically reporting the statistical data to a requesting device in response to being polled for the statistical data or for a reason other than for the statistical data and the statistical data is selected to be reported; and

said means for automatically reporting the statistical data adapted to respond to a request for the statistical data from the system controller, the request received from the system controller only if the statistical data was not timely sent to the system controller by the processor in place of a null response.

33. (Previously Presented) A computer program product, comprising:

a computer usable medium for storing data;

a set of computer program instructions embodied on the computer usable medium, including instructions to:

maintain statistical data about at least one communication port;

automatically pre-gather the statistical data in a buffer;

transmit the statistical data to a system controller in response to being polled for the statistical data or for a reason other than for the statistical data and the statistical data is selected to be reported; and

respond to a request from the system controller for the statistical data, the request received from system controller only if the the statistical data was not timely sent to the system controller in place of a null response by the processor.

34. (Original) The computer program product according to Claim 33 wherein the instructions further include instructions to organize the statistical data in the buffer in a queue.

35. (Original) The computer program product according to Claim 33 wherein the instructions further include instructions to limit the statistical data in the buffer.

36. (Previously presented) The computer program product according to Claim 33 wherein the instructions further include instructions to pregather the statistical data available at at least the rate of being requested by the system controller.

37. (Original) The computer program product according to Claim 33 wherein the instructions further include instructions to make the statistical data available in the buffer as often as necessary but not so often that the buffer is congested by the statistical data.

38. (Original) The computer program product according to Claim 33 wherein the instructions further include instructions to report a subset of the statistical data in place of reporting a null.

39. (Previously Presented) A system for reducing bandwidth consumed by gathering data via a communication bus, comprising:

a system controller gathering data on a communication bus;

at least one element in the system also on the communication bus, said element:

(i) automatically pre-gathering the data in a buffer;

(ii) reporting a subset of the data in the buffer to the system controller in response to being polled for the statistical data or for a reason other than for the statistical data; and

(iii) responding to a request for the statistical data from the system controller, the request received from the system controller only if the statistical data was not timely sent to the system controller in place of a null response by the processor.

40. (Previously Presented) A method for reducing bandwidth consumed by gathering data via a communication bus, comprising:

automatically pre-gathering substantive data in a buffer;

in response to being polled for the statistical data or for a reason other than for the substantive data, reporting the substantive data from the buffer instead of non-substantive data; and

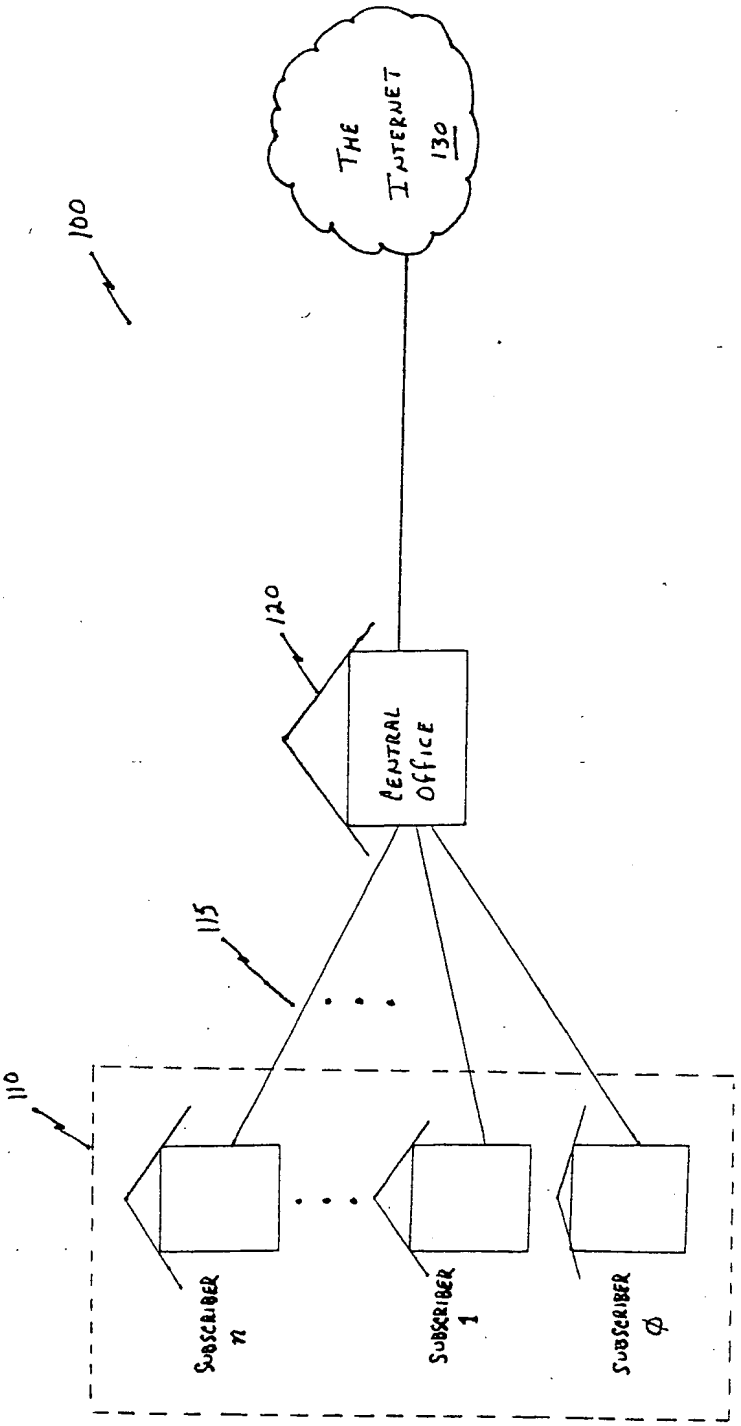
responding to a request from a system controller for the statistical data, the request received from the system controller only if the statistical data was not timely sent to the system controller in place of a null response by the processor.

EVIDENCE APPENDIX

(FIGS. 1-6 of the Applicant's application as originally filed are enclosed herewith.)

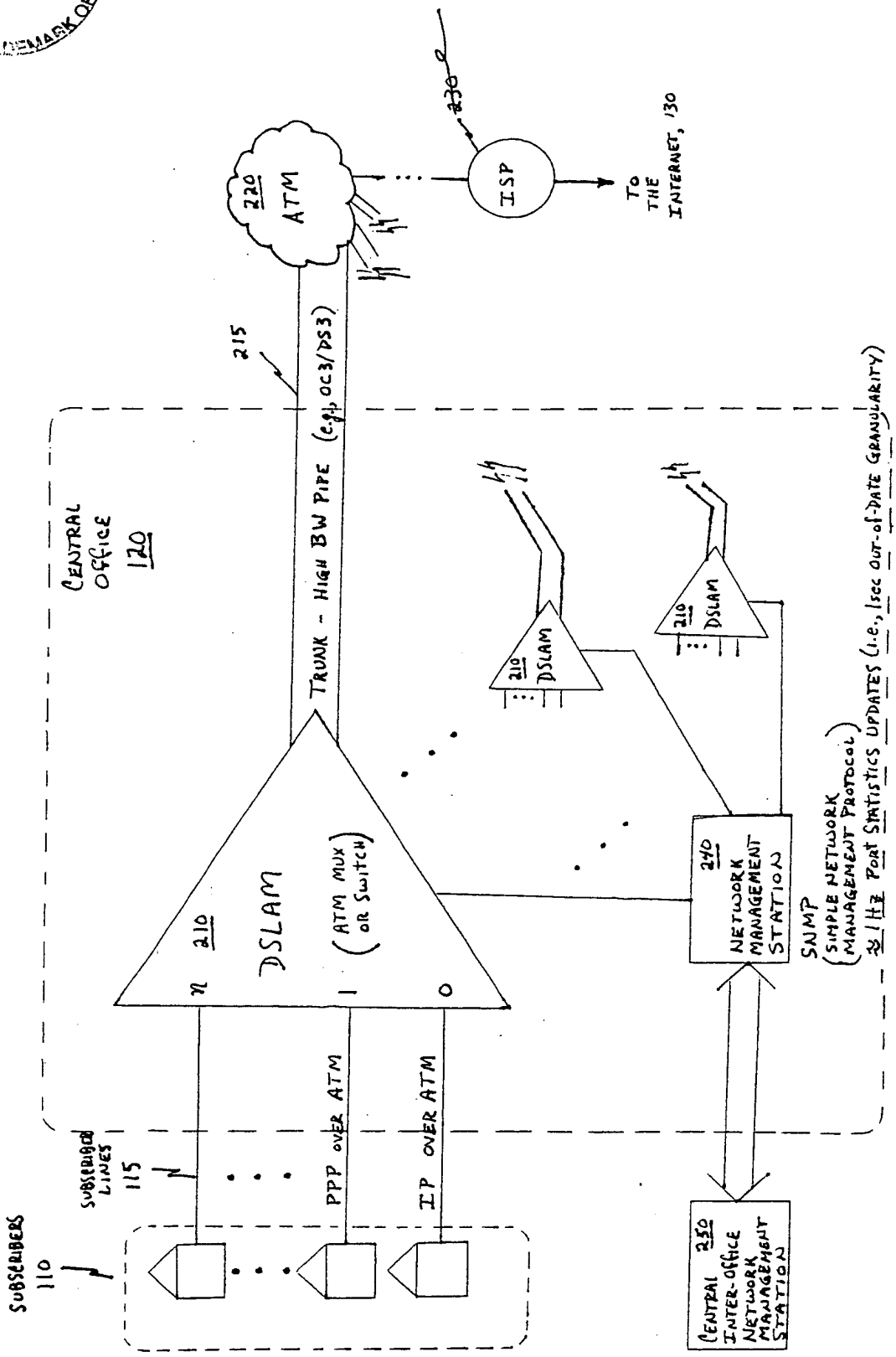
RELATED PROCEEDINGS APPENDIX

(None)



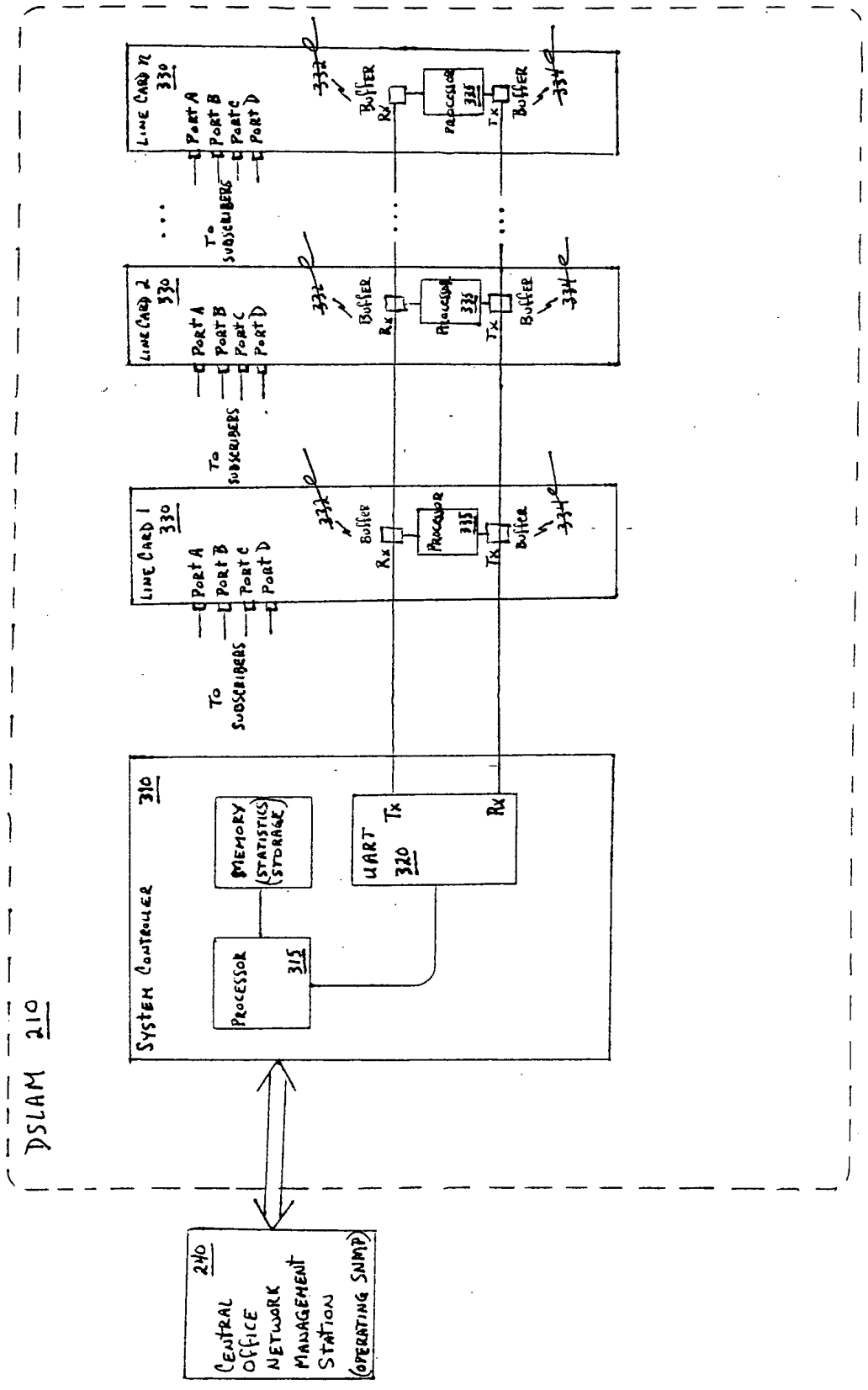
(PRIOR ART)

FIG. 1



(PRIOR ART)

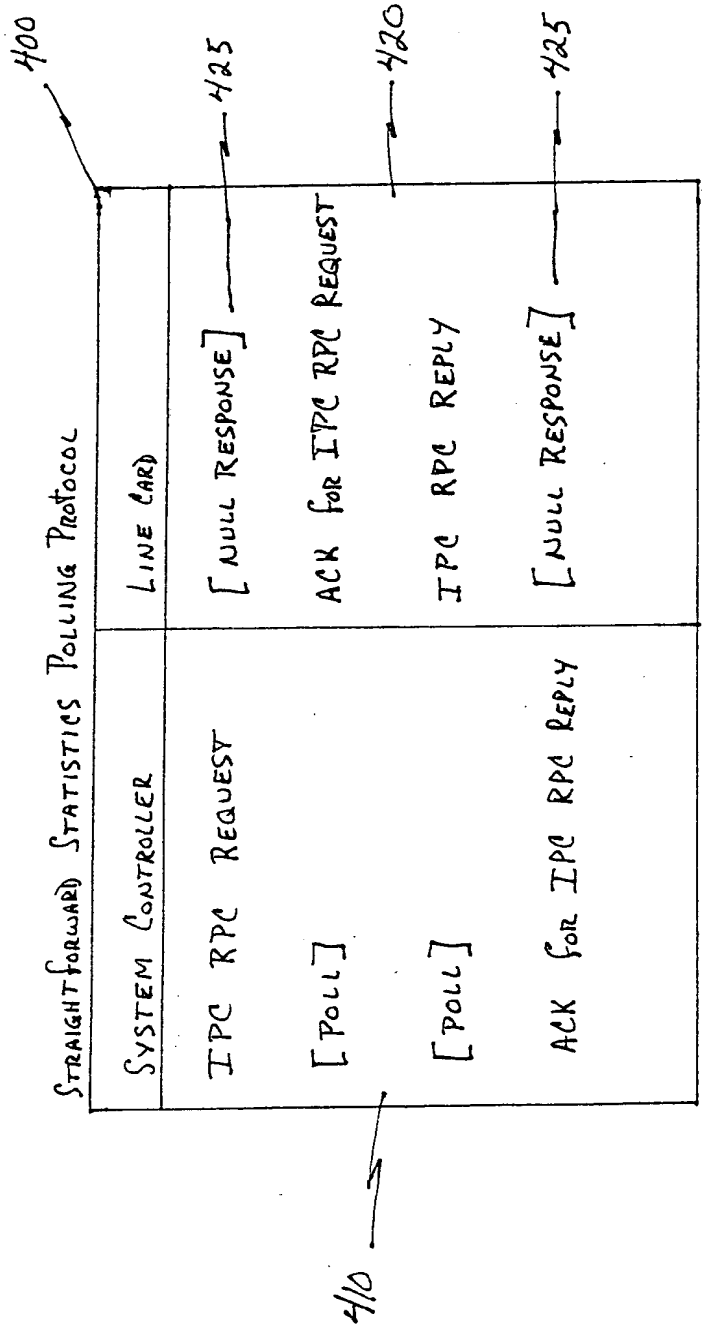
Fig. 2



(PRIOR ART)

FIG. 3

Docket/App No.: 2386.2001-000
Title: An Efficient Method ...
Inventors: David Barach



(PRIOR ART)

FIG. 4

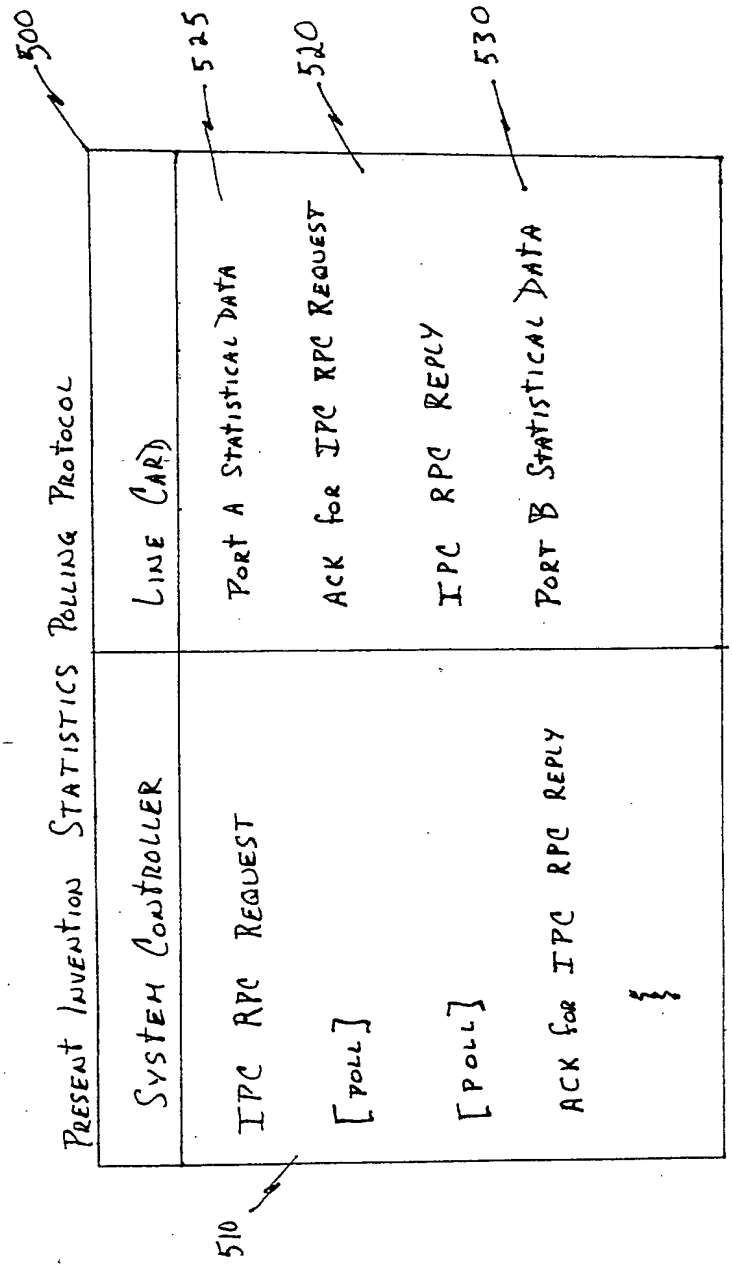


FIG. 5

Docket/App No.: 2386.2001-000
Title: An Efficient Method ...
Inventors: David Barach

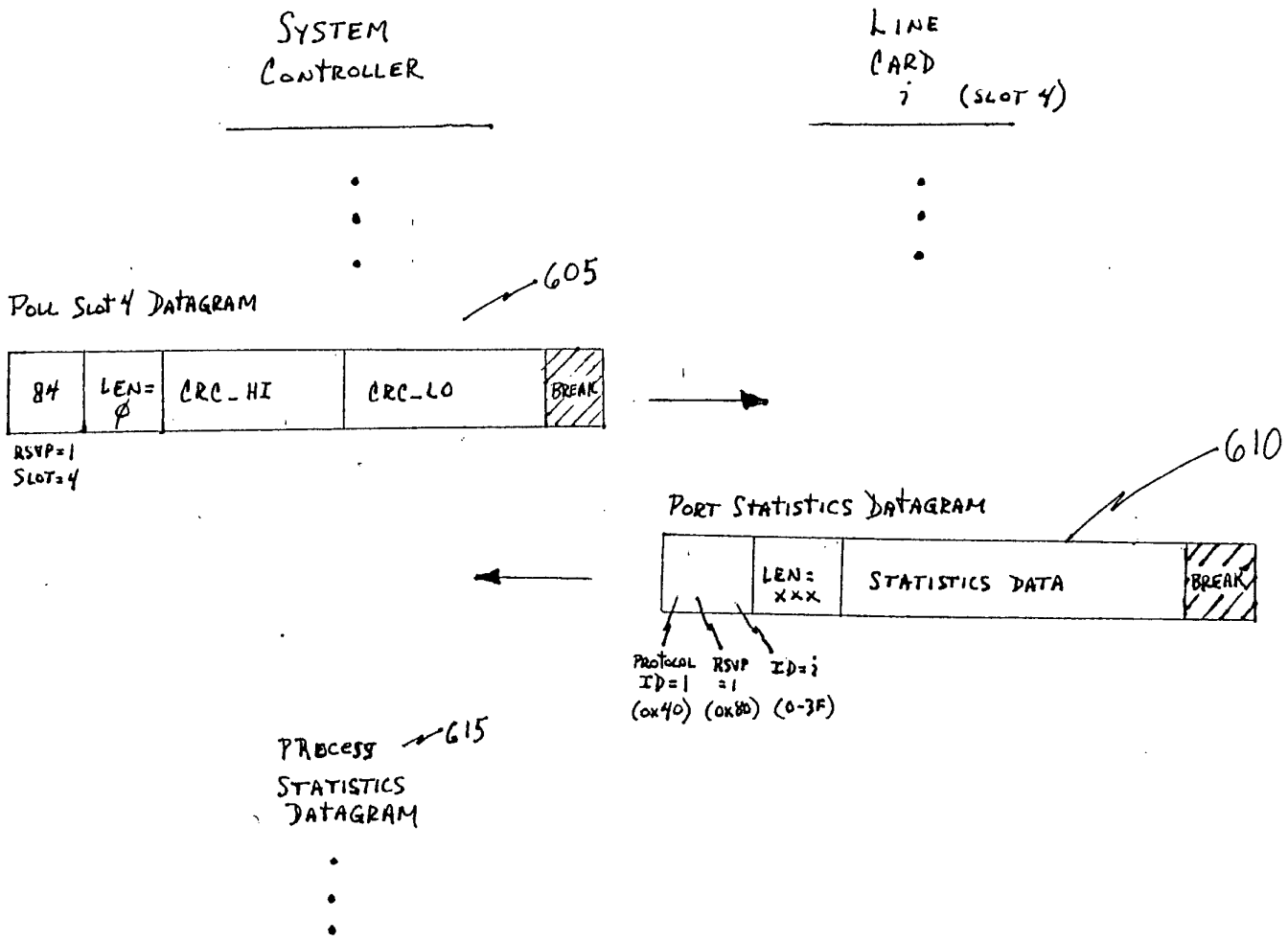


FIG. 6

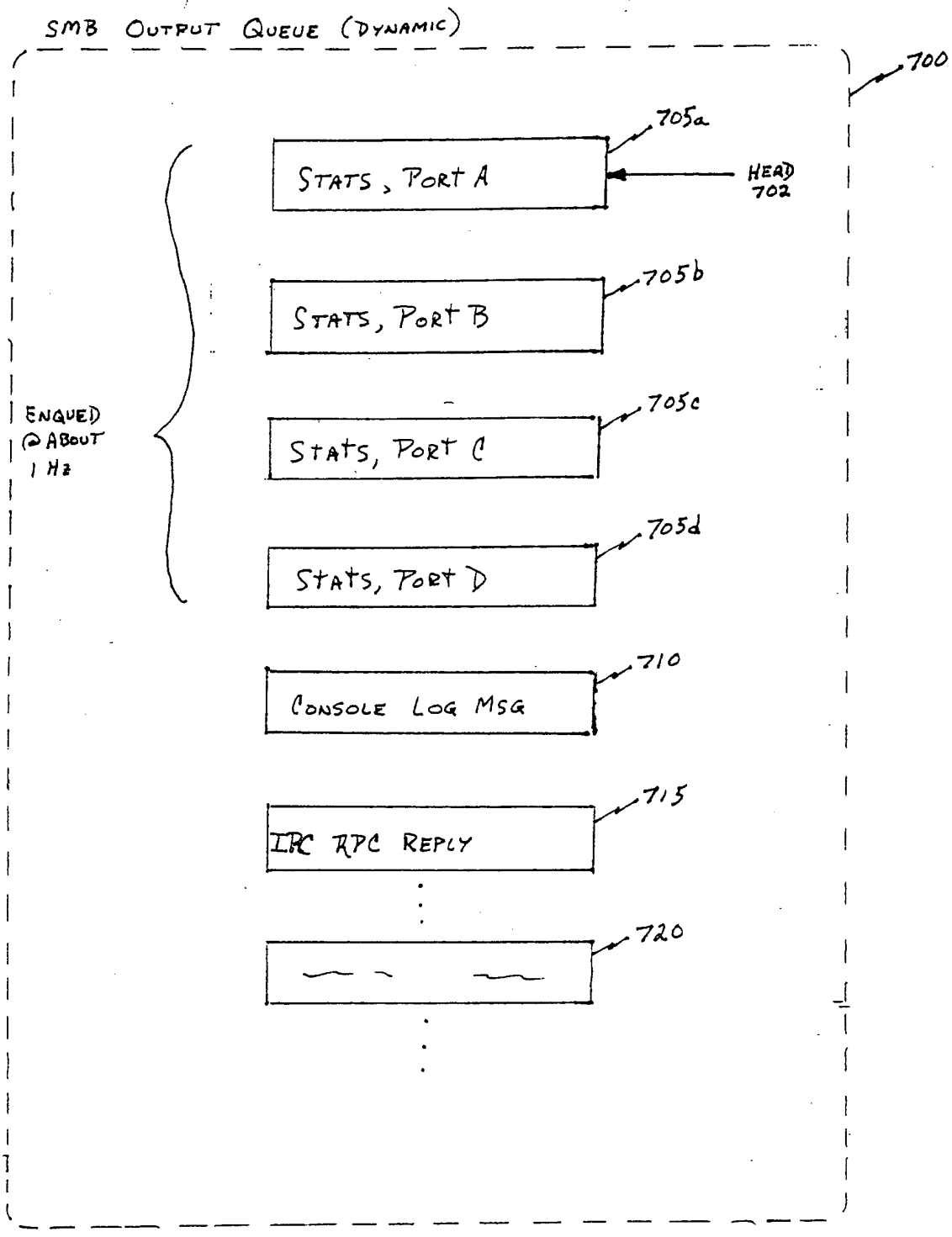


FIG. 7

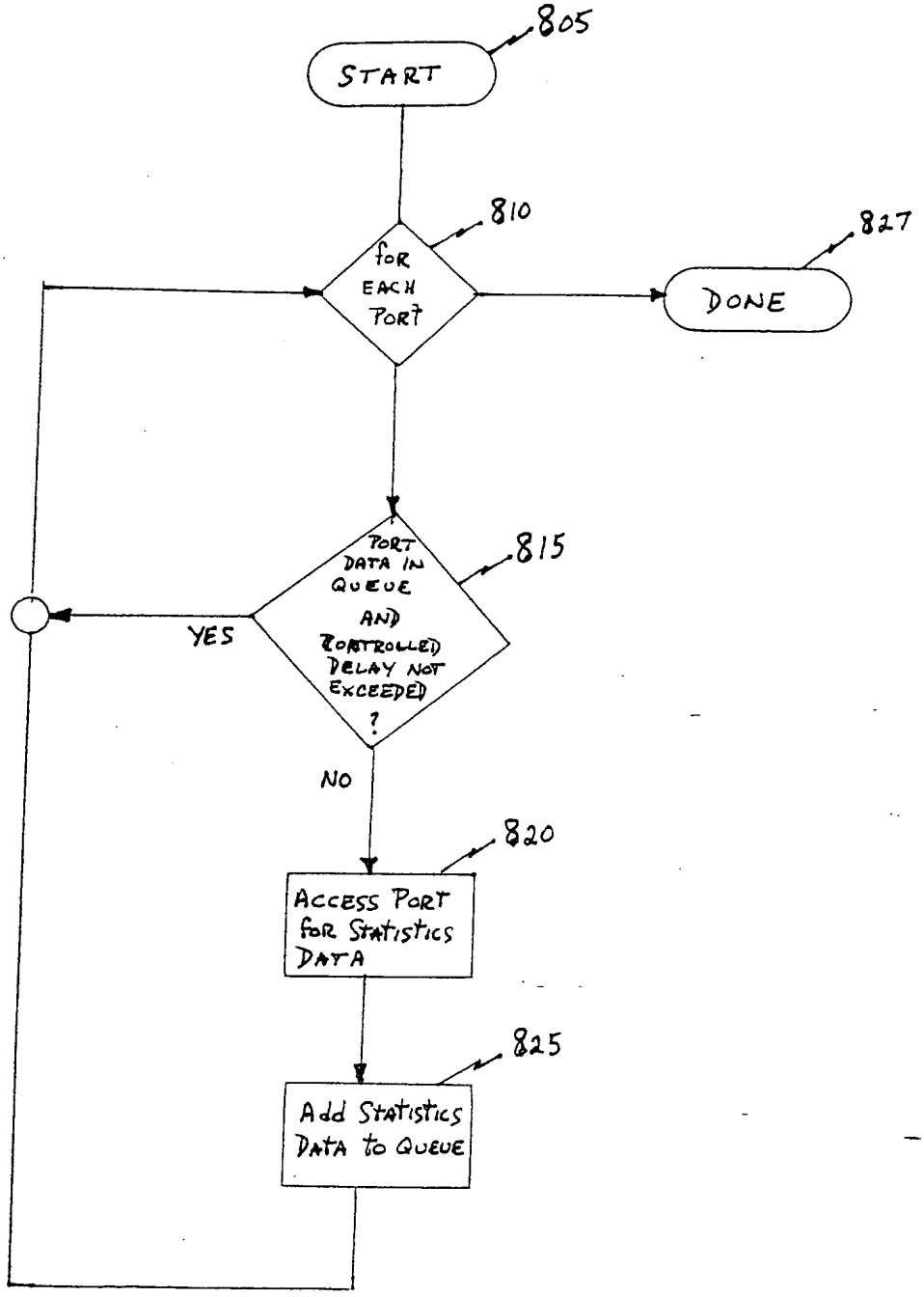


FIG. 8A

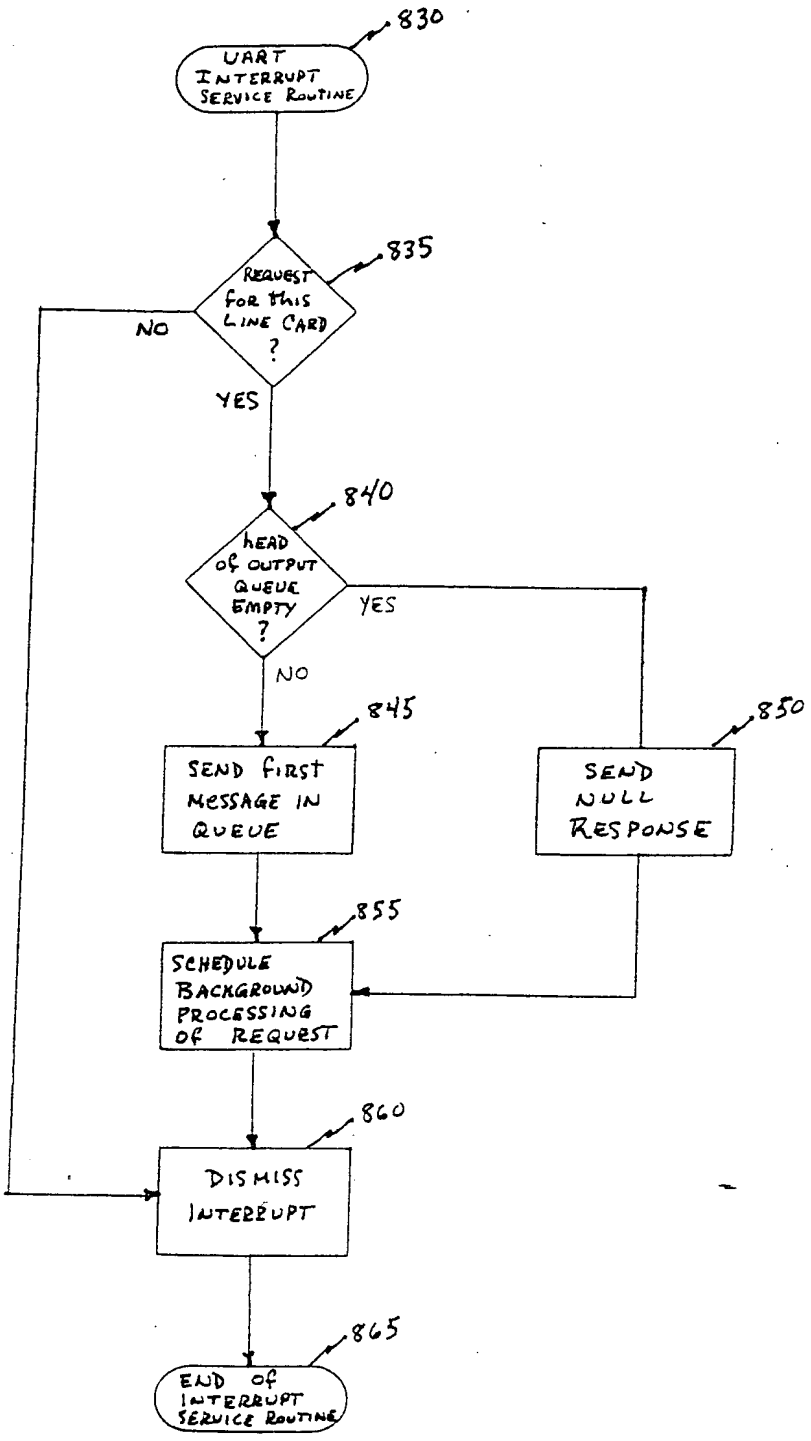


FIG. 8B

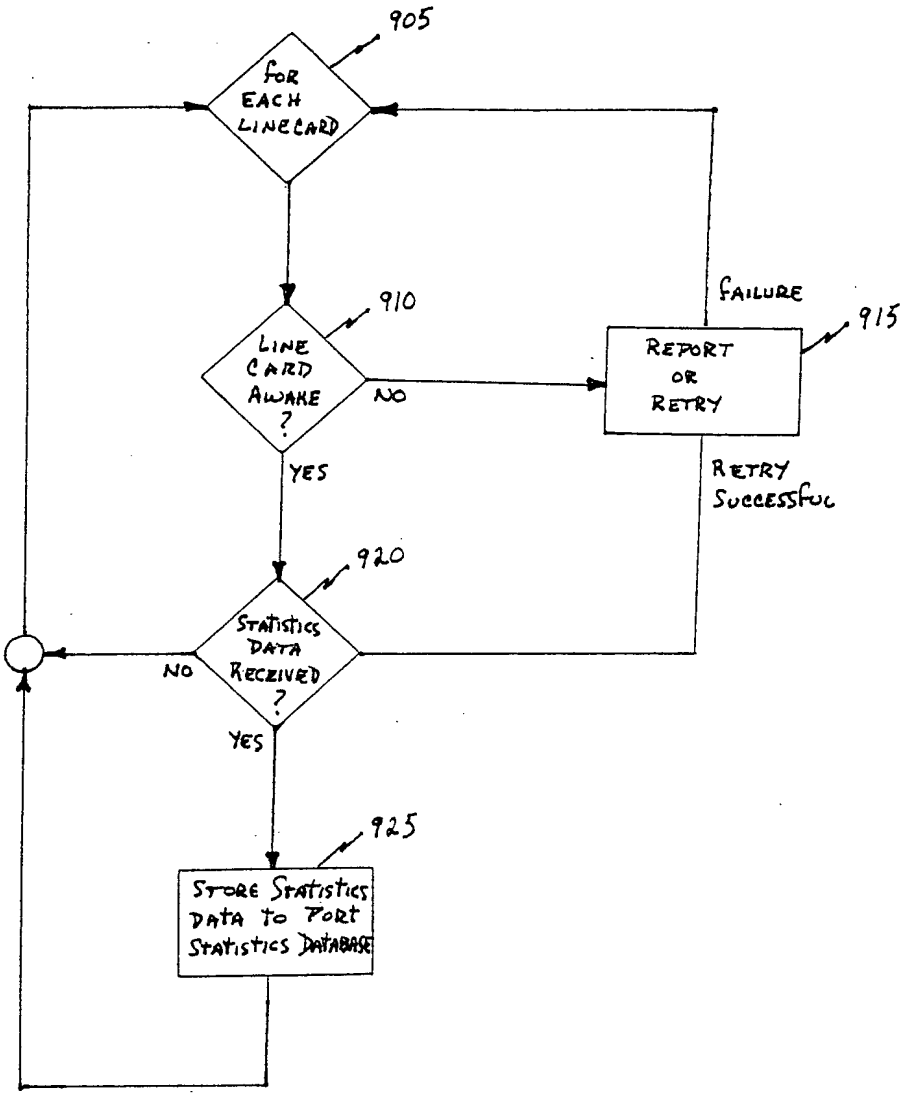


FIG. 9A

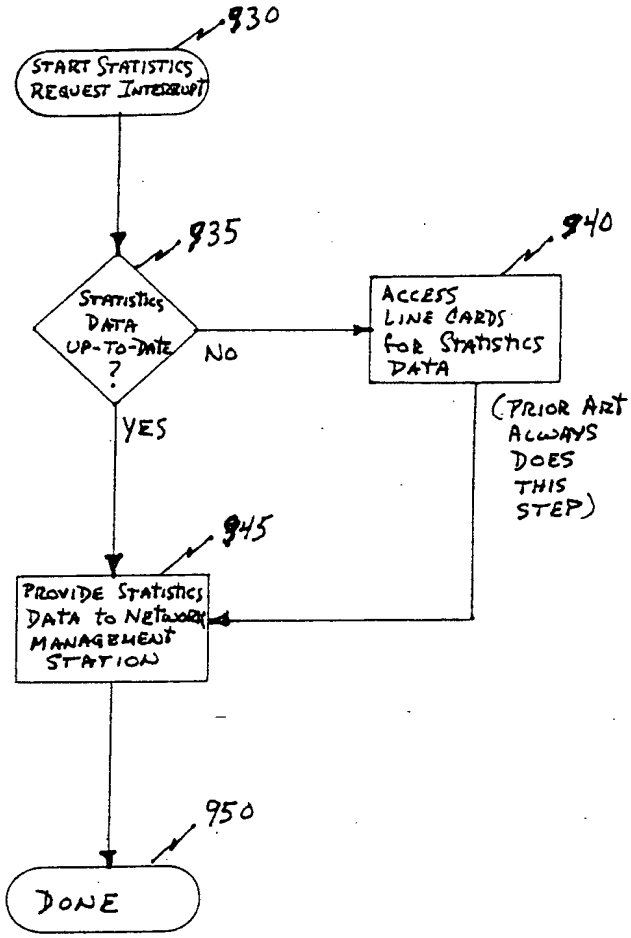


FIG. 9B